SOLAR PROBE PLUS Project

Instrument Provider

Mission Assurance Requirements (MAR)

(MISSION CLASSIFICATION B)

Effective Date:

Expiration Date:

Goddard Space Flight Center

National Aeronautics and Space Administration

CHECK THE Solar Probe Plus MIS AT https://TBD.gsfc.nasa.gov TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE.

CM FOREWORD

This document is a Solar Probe Plus Project controlled document. Changes to this document require prior approval of the Solar Probe Plus Project CCB Chairperson. Proposed changes shall be submitted to the Solar Probe Plus Project Configuration Management Office (CMO), along with supportive material justifying the proposed change.

Questions or comments concerning this document should be addressed to:

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DOCUMENT CHANGE RECORD

Sheet: 1 of 1

REV/ VER LEVEL	DESCRIPTION OF CHANGE	APPROVED BY	DATE APPROVED
-	Initial release		
A	Incorporate changes to section 4.4 and DID 4-4. Change mission classification from C to B. Change name of CSO. Changed mission manager. Changed “Probes” to Probe”		

Table of Contents

List of TBDs/TBRs

Item No.	Location	Summary	Ind./Org.	Due Date
			Name/ Code	MM/YY
			Name/ Code	MM/YY
			Name/ Code	MM/YY
			Name/ Code	MM/YY
			Name/ Code	MM/YY
			Name/ Code	MM/YY
			Name/ Code	MM/YY

Mission Description and Science Overview
Solar Probe Plus will be flying into the Sun's atmosphere or corona, for the first time. Approaching as close as 8.5 solar radii above the Sun's surface, Solar Probe Plus will employ a combination of in situ measurements and imaging to achieve the mission's science objectives:

- Determine the structure and dynamics of the magnetic fields at the sources of the fast and slow solar wind
- Trace the flow of energy that heats the corona and accelerates the solar wind
- Determine what mechanisms accelerate and transport energetic particles
- Explore dusty plasma phenomena in the near-Sun environment and their influence on the solar wind and energetic particle formation to understand how the Sun's corona is heated and how the solar wind is accelerated.

1.0 GENERAL

1.1 Systems Safety and Mission Assurance Program

The developer shall prepare, document, and implement a Mission Assurance Implementation Plan (MAIP) in accordance with the Statement of Work (DID 1-1). The MAIP shall cover:

- All flight hardware and software that is designed, built, or provided by the developer and its subcontractors or furnished by the government, from project initiation through launch and mission operations
- The ground system that interfaces with flight equipment to the extent necessary to assure the integrity and safety of flight items
- The ground data system

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1.2 Management

The developer shall designate a manager for assurance activities. The manager shall have direct access to management that is independent of project management and functional freedom and authority to interact with all elements of the project.

1.3 Requirements Flowdown

The developer shall apply the MAIP to its subcontractors.

1.4 Suspension of Work Activities

The developer shall direct the suspension of any work activity that presents a present hazard, imminent danger, or future hazard to personnel, property, or mission operations resulting from unsafe acts or conditions that are identified by inspection, test, or analysis.

1.5 Contract Data Requirements List

The Contract Data Requirements List (CDRL) identifies Data Item Descriptions (DID) for deliverables. The developer shall deliver data items per the requirements of the applicable DID. The developer shall perform work in accordance with the following definitions:

- Deliver for approval: The Project approves the deliverable within the specified period of time before the developer proceeds with the associated work.

- Deliver for review: The Project reviews the deliverable and provides comments with the specified period of time before the developer proceeds with the associated work. The developer can continue with the associated work while preparing a response to the GSFC comments unless directed to stop work.
- Deliver for information: For Project information only. The developer continues with the associated work.

NOTE: DIDS marked as [included for input] are included to provide guidance as to the type of information required by the instrument provider to the project office. The instrument provider shall provide the information included in the DID, to be incorporated into the Project Office deliverable.

1.6 Surveillance

The developer shall grant access for National Aeronautics and Space Administration (NASA) and NASA assurance representatives to conduct an audit, assessment, or survey upon notice. The developer shall supply documents, records, equipment, and a work area within the developer's facilities.

Note: see Federal Acquisition Regulations (FAR) Parts 46.103, 46.104, 46.202-2, 46.4, and 46.5 for government quality assurance requirements at contractor facilities. See FAR Part 52.246 for inspection clauses by contract type.

1.7 Use of Previously Developed Product

The developer shall document the compliance of previously developed product with the requirements of the MAIP (DID 1-2).

2.0 QUALITY MANAGEMENT SYSTEM

2.1 General

The developer shall have a Quality Management System that is compliant with the requirements of SAE AS9100 Quality Systems - Aerospace - Model for Quality Assurance in Design, Development, Production, Installation and Servicing. The developer shall provide a copy of the Quality Manual to

the Project Office (DID 2-1).Once approved, the Prject office shall be kept informed of any changes to the QMS system.

2.2 Supplemental Quality Management System Requirements

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2.2.1 Control of Nonconforming Product

Control of Nonconforming Product– The developer shall have a documented closed loop system for identifying, reporting, and correcting nonconformances. The system will ensure that positive corrective action is implemented to preclude recurrence, that objective evidence is collected, and that the adequacy of corrective action is determined by audit or test.

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2.2.2 Material Review Board (MRB)

Material Review Board (MRB) – The developer shall have a documented process for the establishment and operation of a MRB to process nonconformances, including the definitions of major and minor nonconformances. The developer shall appoint a MRB chairperson who is responsible for implementing the MRB process and functional and project representatives as MRB members. The developer shall inform the project office of MRB actions (DID 2-2). The program SMA and Systems Engineering ITAs (Independent Technical Authority), or their designees shall serve as standing members of the MRB board for class 1 changes.

The MRB will use the following disposition actions:

- Scrap — the product is not usable
- Re-work — the product will be re-worked to conform to requirements
- Return to supplier — the product will be returned to the supplier
- Repair — the product will be repaired using a repair process approved by the MRB
- Use as is — the product will be used as is

The developer shall submit a waiver to requirements for project approval for a use-as-is disposition involving a major nonconformance (DID 2-3).

2.2.3 Reporting of Anomalies

The developer shall have a documented process for reporting anomalies. The developer shall report hardware anomalies beginning with the first application of power at the component level, software anomalies beginning with first use of the flight build software, and mechanical system anomalies beginning with the first operation (DID 2-4).

2.2.4 Configuration Management

Each developer shall perform configuration management (CM) in support of the Solar Probe Plus Project. Developers shall document the CM process in a Configuration Management Plan submitted to the ProbeProject as part of their Mission Assurance Implementation Plan (MAIP). The configuration of deliverable items shall be maintained throughout all phases of assembly and test. Configuration verification shall be performed and documented as assemblies are incorporated into higher-level assemblies and at major Project milestones (i.e. pre-environmental test, pre-ship, pre-launch, etc). The CM system shall have a change classification and impact assessment process that results in Class1 changes being forwarded to the Solar Probe Plus Program and Project for disposition and approval. Class 1 changes are defined as major changes that affect mission requirements, system safety, cost, schedule, and external interfaces. All other changes are considered to be Class 2 changes. Any flight item that is found to be non-compliant with the requirements of the contract Statement Of Work (SOW) or the MAR and is not reworked to be compliant, or is not replaced with a compliant item, shall be dispositioned via a waiver. Waivers that affect mission requirements, system safety, cost, schedule, and external interfaces are to be processed as Class I. The GSFC SMA and Systems Engineering T/A, or their designees shall serve as standing members of the change control board (CCB) for class 1 changes.

3.0 SYSTEM SAFETY

3.1 General

The developer shall provide input to the project office as required to allow the documentation and compliance with the requirements of NASA Procedural Requirement (NPR) 8715.3 NASA Safety Manual, NPR 8715.7 Expendable Launch Vehicle Payload Safety Program, launch service provider requirements, and launch range safety requirements (DID 3-1[included for input]).

Specific safety requirements include the following:

- The developer shall incorporate three inhibits in the design (dual fault tolerant) if a system failure may lead to a catastrophic hazard. A catastrophic hazard is defined as a condition that may cause death or a permanent disabling injury or the destruction of a major system or facility on the ground or of the vehicle during the mission.
- The developer shall incorporate two inhibits in the design (single fault tolerant if a system failure may lead to a critical hazard. A critical hazard is defined as a condition that may cause a severe injury or occupational illness to personnel or major property damage to facilities, systems, or flight hardware.
- The developer shall adhere to specific detailed safety requirements, including compliance verification that must be met for design elements with hazards that cannot be controlled by failure tolerance. These design elements, e.g., structures and pressure vessels, are called "Design for Minimum Risk" areas.

3.1.1 Mission Related Safety Requirements Documentation

The developer shall provide input to the project office concerning launch range requirements. The most stringent applicable safety requirement shall take precedence in the event of conflicting requirements.

ELV Eastern Test Range (ETR) or Western Test Range (WTR) Missions

- AFSPCMAN 91-710, "Range Safety User Requirements"
- KNPR 8715.3, "KSC Safety Practices Procedural Requirements"
- NASA-STD-8719.14, "Process for Limiting Orbital Debris"
- NPR 8715.3, "NASA General Safety Program Requirements"
- NPR 8715.6A, "NASA Procedural Requirements for Limiting Orbital Debris"
- NPR 8715.7, "Expendable Launch Vehicle Payload Safety Program"
- Facility-specific Safety Requirements, as applicable
- NSS 1740.12, "Safety Standard for Explosives, Propellants, and Pyrotechnics"

3.1.2 Payload Integration Facility Requirements

The developer shall document and implement procedures that comply with applicable installation safety requirements when performing integration and test activities and pre-launch activities at the launch site (DID 3-2). The developer shall provide safety support for hazardous operations at the launch site.

3.2 System Safety Deliverables

3.2.1 Safety Requirements Compliance Checklist

The developer shall provide input to the project office as required, to be included in the Safety Requirements Compliance Checklist, used to demonstrate that the payload is in compliance with NASA and range safety requirements (DID 3-3[included for input]). Noncompliance to safety requirements will be documented in waivers and submitted for approval.

3.2.2 Analysis

3.2.2.1 Preliminary Hazard Analysis

The developer shall provide input to the project office for the completion of the Preliminary Hazard Analyses (PHA) (DID 3-4[included for input])

3.2.2.2 Operations Hazard Analysis

The developer shall provide input to the project office as required to allow completion of the Operations Hazard Analysis (OHA) and a Hazard Tracking Log, to demonstrate that hardware operations, test equipment operations, and integration and test (I&T) activities comply with facility safety requirements and that hazards associated with those activities are mitigated to an acceptable level of risk (DID 3-5[included for input]). The project shall maintain and update the Hazard Tracking Log during I&T (including observatory level) activities to track open issues.

The developer shall meet the safety requirements of NASA-STD-8719.9 Standard for Lifting Devices and Equipment apply when NASA-owned or NASA contractor-supplied equipment is used in support of NASA operations at NASA installations.

The developer shall meet the safety requirements of NASA-STD-8719.9 Standard for Lifting Devices and Equipment when performing NASA work at contractor facilities.

3.2.2.3 Operating and Support Hazard Analysis –

The developer shall provide input to the project office as required to allow completion of the Operating and Support Hazard Analyses (O&SHA) to evaluate activities for hazards introduced during pre-launch processing and to evaluate the adequacy of operational and support procedures used to eliminate, control, or mitigate hazards (DID 3-6[included for input]).

3.2.2.4 Software Safety Analysis –

The developer shall provide input to the project office for the completion of the Software Safety Analyses to demonstrate that adequate inhibits and controls are incorporated to eliminate or mitigate hazards associated with software.

3.2.2.5 Missile System Pre-Launch Safety Package (MSPSP) –

The developer shall provide input to the project office for the completion of the integrated MSPSP. This report shall be in the form of an Instrument Safety Assessment Report (ISAR)(DID 3-7)

3.2.3 Verification Tracking Log

The developer shall provide input to the project office for the completion of the Verification Tracking Log (VTL) (DID 3-8[included for input]).

3.2.4 Safety Waivers

The developer shall submit Safety Waivers or Deviations for variations to the applicable safety requirements (DID 3-9).

3.2.5 Orbital Debris Assessment

The developer shall provide input to the project office for the completion of the Orbital Debris Assessment (ODA) (DID 3-10[included for input])

3.2.6 Mishap Reporting and Investigation

The developer shall prepare a contingency plan (DID 3-11). The developer shall report mishaps, incidents, and close calls per NPR 8621.1 NASA Procedures and Guidelines for Mishap Reporting, Investigating, and Recordkeeping.

3.2.7 Range Safety Forms

The developer shall provide input to the project safety engineer for incorporation into the following:

- Material Selection List for Plastic Films, Foams, and Adhesive Tapes (DID 3-12[included for input])
- Radiation forms/analysis (DID 3-13[included for input])
- Process Waste Questionnaire (DID 3-14[included for input])
- Environmental Impact Statement (DID 3-15[included for input])

4.0 PROBABILITY RISK ANALYSIS AND RELIABILITY

4.1 Probabilistic Risk Assessment (PRA) and Reliability Program Plan

The Developer shall provide input to the project office for the completion of the PRA and Reliability Program Plan using both qualitative and quantitative techniques to support decisions regarding mission success and safety throughout system development. The developer shall present the implementation of these plans and related activities at milestone reviews beginning with the System Requirements Review (DID 4-1[included for input]).

4.2 PRA

The developer shall provide input to the project office for the completion of a limited scope PRA (DID 4-2[included for input]).

4.3 Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL)

The developer shall perform a FMEA and prepare and maintain a CIL for severity categories 1, 1R, 1S, 2, and 2R per Table 4.1 (DID 4-3). The developer shall analyze single point failure modes resulting in severity categories 1, 1R, 1S, 2, or 2R to determine the root cause, corresponding mitigation actions, and retention rationale. The developer shall address flight hardware and software that is designed, built, or provided by their organization or subcontractors, from development through launch and mission operations. The developer shall address the ground system that interfaces with flight equipment to the extent necessary to assure the integrity and safety of flight items. The developer shall identify and address safety critical software, as defined in NASA-STD-8719.13

Table 4.1 Severity Categories

Category	Severity	Description
1	Catastrophic	Failure modes that could result in serious injury, loss of life (flight or ground personnel), or loss of launch vehicle.
1R		Failure modes of identical or equivalent redundant hardware or software elements that could result in Category 1 effects if all failed.
1S		Failure in a safety or hazard monitoring system that could cause the system to fail to detect a hazardous condition or fail to operate during such condition and lead to Category 1 consequences.
2	Critical	Failure modes that could result in loss of one or more mission objectives as defined by the GSFC project office.
2R		Failure modes of identical or equivalent redundant hardware or software that could result in Category 2 effects if all failed.
3	Significant	Failure modes that could cause degradation to mission objectives.
4	Minor	Failure modes that could result in insignificant or no loss to mission objectives

4.4 Fault Tree Analysis

The developer shall perform a qualitative fault tree analyses to address mission failures and degraded modes of operation and shall perform quantitative fault tree analyses to address undesirable fault propagation scenarios as part of the PRA (DID4-4[included for input]). The developer shall identify and address safety critical software as defined in NASA-STE-8719.13 that is identified as part of the FMEA process.

4.5 Parts Stress Analysis

The developer shall perform parts stress and derating analyses for electrical, electronic, and electromechanical (EEE) parts in accordance with GSFC INST-EEE-002 (DID 4-5).

4.6 Worst Case Analysis

The developer shall perform a worst-case analysis for circuits (DID 4-6)

4.7 Reliability Assessments and Predictions

The developer shall provide information to the project office to allow completion of a comparative numerical reliability assessments and reliability predictions (DID 4-7[included for input]).

4.8 Reliability Analysis of Test Data

The developer shall use data from the test program to assess reliability and identify potential or existing problem areas.

4.9 Trend Analysis

The developer shall prepare and maintain a list of subsystem and components to be assessed, parameters to be monitored, and trend analysis reports as defined in the approved PRA and Reliability Program Plan. The developer shall begin the monitoring, collection, and analysis at component acceptance testing and continue through the system integration and test phases.

4.10 Analysis of Test Results

The developer shall document the analysis of test information, trend data, and failure investigations with respect to reliability and report the results as defined in the approved PRA and Reliability Program Plan.

4.11 Limited Life Items

The developer shall prepare and implement a plan to identify and manage limited life items (DID 4-8).

5.0 SOFTWARE ASSURANCE (FLIGHT AND GROUND SEGMENTS)

5.1 Applicable Requirements

The developer shall comply with the following for software and firmware, hereafter collectively referred to as software:

- NPR 7150.2 NASA Software Engineering Requirements
- NASA-STD-8719.13 NASA Software Safety Standard
- NASA-STD-8739.8 NASA Standard for Software Assurance

The developer shall classify software and identify software safety criticality per the requirements of the above documents.

Note: Software safety and software criticality are addressed in Sections 3 and 4, respectively.

5.2 Software Quality Assurance

The developer shall prepare and implement a software quality assurance plan for software, including government off-the-shelf software (GOTS), modified off-the-shelf software (MOTS), and commercial off-the-shelf software (COTS) (DID 5-1). The developer shall identify the person responsible for directing and managing the software quality assurance program.

5.3 Verification and Validation

The developer shall prepare and implement a Verification and Validation (V&V) program plan to ensure that the software satisfies functional and performance requirements (DID 5-2).

5.4 Reviews

The developer shall conduct and document periodic reviews, audits, and assessments of the software development process and products. In addition to the reviews specified in Section 8, the developer shall provide advance notification to the project office of the following software reviews:

- Test Readiness Review
- Acceptance Review
- Software Safety Program Reviews or system level safety reviews

5.5 Software Configuration Management

The developer shall prepare and implement a software configuration management plan (DID 5-3).

5.6 Government Furnished Equipment (GFE), Existing, and Purchased Software

The developer shall ensure that software provided as GFE, existing, and purchased meets the functional, performance, and interface requirements. The developer shall ensure that the software meets applicable standards, including those for design, code, and documentation.

5.7 Version Description Documents (VDD)

The developer will prepare VDDs that identify and document the version of the computer software configuration items (CSCIs) and other deliverable items that comprise the software build or release, including changes since the last VDD was issued (DID 5-4).

5.8 Surveillance of Software Development

The developer shall provide the following:

- Access to the software problem reporting system, either through remote means or paper copies
- Access to the software documentation (management plans, assurance plans, configuration management plans, design plans)
- Access to the software review results
- Access to the corrective actions from process and product audits
- Notification of engineering peer reviews (e.g., code reviews)
- Access to review action item status and resolution
- Software status report (DID 5-5)

6.0 GROUND SYSTEMS AND EQUIPMENT

6.1 General

The developer shall prepare and implement a mission assurance implementation plan for ground systems equipment to assure the function and integrity of flight items (DID 6-1).

6.2 Ground Support Equipment

The developer shall document and implement a ground support equipment program for flight and ground operations products (DID 6-2)

6.3 Flight Operations Ground Support Equipment

The developer shall prepare and implement a program to design, build, and test the ground support equipment for launch and flight operations (DID 6-3).

7.0 RISK MANAGEMENT

7.1 General

The developer shall document and implement a risk management plan (DID 7-1).

7.2 Risk List

The developer shall prepare and maintain a risk list (DID 7-2).

8.0 SYSTEMS REVIEWS

8.1 Systems Reviews

The developer shall participate in the implementation of the Integrated Independent Review Program as required by GSFC-STD-1001.

The developer shall provide a review agenda, presentation materials, and a copy of reference materials at the reviews (DID 8-1).

The developer shall submit responses to review action items (DID 8-2).

8.2 Peer Reviews

The developer shall prepare and implement an engineering peer review program that covers the design, development, and testing of hardware and software (DID 8-3).

9.0 SYSTEM PERFORMANCE VERIFICATION

9.1 System Performance Verification Program Plan

The developer shall plan and implement a system performance verification program per the requirements of GSFC-STD-7000 General Environmental Verification Standard (DID 9-1).

9.2 Environmental Verification Plan

The developer shall prepare and implement an environmental verification plan (DID 9-2).

9.3 System Performance Verification Matrix

The developer shall prepare and maintain a system performance verification matrix (DID 9-3).

9.4 Environmental Test Matrix

The developer shall prepare and maintain an environmental test matrix (DID 9-4).

9.5 Verification Reports

The developer shall prepare and submit verification reports (DID 9-5).

9.6 System Performance Verification Report

The developer shall prepare and submit system performance reports (DID 9-6).

10.0 WORKMANSHIP

10.1 General

The developer shall implement a workmanship program to assure that electronic packaging technologies, processes, and workmanship meet mission objectives for quality and reliability per the requirements of the following standards:

- NASA-STD-8739.1 Workmanship Standard for Staking and Conformal Coating of Printed Wiring Boards and Electronic Assemblies
- NASA-STD-8739.2 Surface Mount Technology

- NASA-STD-8739.3 Soldered Electrical Connections
- NASA-STD-8739.4 Crimping, Interconnecting Cables, Harnesses, and Wiring
- NASA-STD-8739.5 Fiber Optic Terminations, Cable Assemblies, and Installation
- IPC-2221 Generic Standard on Printed Board Design
- IPC-2222 Sectional Design Standard for Rigid Organic Printed Boards
- IPC-2223 Sectional Design Standard for Flexible Printed Boards
- IPC-2225 Sectional Design Standard for Organic Multichip Modules (MCM-L) and MCM-L Assemblies
- IPC A-600 Acceptability of Printed Boards (Class 3 requirements)
- IPC-6011 Generic Performance Specification for Printed Boards (Class 3 requirements)
- IPC-6012 Qualification and Performance Specification for Rigid Printed Boards (Class 3/A requirements)
- IPC-6013 Qualification and Performance Specification for Flexible Printed Boards (Class 3 requirements)
- IPC-6015 Qualification and Performance Specification for Organic Multichip Module (MCM-L) Mounting and Interconnecting Structures
- IPC-6018 Microwave End Product Board Inspection and Test

10.2 Design and Process Qualification

The developer shall qualify designs and processes that are not covered by the above standards.

10.3 Electrostatic Discharge Control (ESD)

The developer shall prepare and implement an ESD control program that conforms to the requirements of ANSI/ESD S20.20 (DID 10-1).

11.0 EEE PARTS

11.1 General

The developer shall plan and implement a parts control program (PCP) per the Level 2 requirements of GSFC EEE-INST-002 (DID 11-1).

11.2 Parts Control Board

The developer shall establish a parts control board (PCB) that is responsible for the planning, management, and coordination of the selection, application, and procurement requirements of EEE parts (DID 11-2). The program PPE shall be a standing member of the PCB.

11.3 EEE Parts Lists

The developer shall develop and maintain EEE parts lists.

11.3.1 Parts Identification List (PIL)

The developer shall prepare a list of EEE parts that are proposed for use in flight hardware and approved by the PCB (DID 11-3).

11.3.2 Project Approved Parts List (PAPL)

The developer shall prepare a list of EEE parts that are approved for use in flight hardware by the PCB (DID 11-4).

11.3.3 As-designed Parts List (ADPL)

The developer shall prepare a list of EEE parts that are used in the design of flight hardware (DID 11-5).

11.3.4 As-built Parts List (ABPL)

The developer shall prepare a list of EEE parts that are used in the flight hardware (DID 11-6).

12.0 MATERIALS AND PROCESSES

12.1 General

The developer shall prepare and implement a materials and processes selection, implementation, and control plan per the requirements of NASA-STD-6016 (DID 12-1).The Program Office Materials engineer shall serve as a standing member of the Materials control board.

12.2 Life Test Plan for Lubricated Mechanisms

The developer shall prepare and implement a life test plan for lubricated mechanisms (DID 12-2).

12.3 Materials Usage Agreement (MUA)

The developer shall prepare materials usage agreements as required for all non-compliant materials proposed for flight. (DID 12-3).

12.4 Materials Identification and Usage List (MIUL)

The developer shall prepare a materials identification and usage list (DID 12-4).

12.5 Nondestructive Evaluation (NDE) Plan

The developer shall prepare and implement a nondestructive evaluation plan for the procedures and specifications used in the inspection of materials (DID 12-5).

12.6 Printed Wiring Board Test Coupons

The developer shall provide printed wiring board test coupons to the GSFC or to a GSFC approved facility for analysis (DID 12-6). The developer shall not use printed wiring boards until the analysis results are received.

12.7 Lead-free and Tin Whisker Control

The developer shall meet the requirements of GEIA-STD-0005-1 and GEIA-STD-0005-2 for solders and surface finishes that are less than 3% lead by weight.

- GEIA –STD-0005-1: Performance Standard for Aerospace and High Performance Electronics Systems Containing Lead-free Solder
- GEIA-STD-0005-2: Standard for Mitigating the Effects of Tin Whiskers in Aerospace and High Performance Electronic Systems

13.0 CONTAMINATION CONTROL

13.1 Contamination Control Plan

The developer shall prepare and implement a contamination control program (DID 13-1).

14.0 METROLOGY AND CALIBRATION

14.1 Metrology and Calibration Program

The developer shall plan and implement a documented metrology and calibration program. The developer shall comply with ANSI/NCSL Z540.1-1994 Calibration Laboratories and Measuring and Test Equipment – General Requirements.

14.2 Use of Non-calibrated Instruments

The developer shall limit the use of non-calibrated instruments to applications where substantiated accuracy is not required and for indication-only purposes in non-hazardous, non-critical applications.

15.0 GIDEP ALERTS AND PROBLEM ADVISORIES

15.1 Government-Industry Data Exchange Program (GIDEP)

The developer shall participate in GIDEP per the GIDEP Operations Manual S0300-BT-PRO-010 and GIDEP Requirements Guide S0300-BU-GYD-010 (Note: these documents are available through http://www.gidep.org).

15.2 Reviews

The developer shall review the following, hereafter referred to collectively as Alerts, for affects on NASA products: GIDEP Alerts; GIDEP SAFE-ALERTS; GIDEP Problem Advisories; GIDEP Agency Action Notices; NASA Advisories and component issues as distributed by the project office.

15.3 Actions

The developer shall take action to eliminate or mitigate the effects of Alerts on NASA products.

15.4 Reporting

The developer shall report the results of Alert reviews and actions taken (DID 15-1).

The developer shall prepare and submit failure experience data reports per the requirements of S0300-BT-PRO-010 and S0300-BU-GYD-010 whenever failed or nonconforming items that are available to other buyers are discovered.

The developer shall report significant EEE parts, materials, and safety problems (DID 15-2).

The developer shall report the status of NASA products that are affected by Alerts or by significant EEE parts, materials, and safety problems at program milestone reviews and readiness reviews (see Section 8). The developer shall include a summary of the review status for EEE parts and materials lists and of actions taken to eliminate or mitigate negative effects.

16.0 END ITEM ACCEPTANCE DATA PACKAGE

16.1 General

The developer shall prepare, maintain, and submit an end item acceptance data package (DID 16-1).

DID 1-1 Mission Assurance Implementation Plan

Title: Mission Assurance Implementation Plan	CDRL No.: 1-1
Reference: MAR Paragraph 1.1	
Use: Documents the developer's plan for implementing a system safety and mission assurance program	
Related Documents:	
Place/Time/Purpose of Delivery: - Delivered to the Project Office sixty (60) days after contract award for approval	
Preparation Information: The MAIP shall cover: - All flight hardware and software that is designed, built, or provided by the developer and its subcontractors, or furnished by the government, from project initiation through launch and mission operations - The ground system that interfaces with flight equipment to the extent necessary to assure the integrity and safety of flight items - The ground data system - Configuration Management The MAIP shall include a traceability matrix for the mission assurance requirements	

DID 1-2 Previously Developed Product – Compliance with Requirements

Title: Previously Developed Product – Compliance with Requirements	CDRL No.: 1-2
Reference: MAR Paragraph 1.7	
Use: Documents the compliance of previously developed product with the requirements of the SOW and the MAIP	
Related Documents: Mission Assurance Implementation Plan	
Place/Time/Purpose of Delivery: - Delivered to the Project Office thirty 30 days after identification of the previously developed product for approval	
Preparation Information: The document shall identify the requirements that apply to the previously developed product through a requirements compliance matrix for the product's specific characteristics and its development. The document shall address all areas of noncompliance through a waiver or deviation.	

DID 2-1 Quality Manual

Title: Quality Manual	CDRL No.: 2-1
Reference: MAR Paragraph 2.1	
Use: Documents the developer's quality management system.	
Related Documents: - SAE AS9100 Quality Systems - Aerospace - Model for Quality Assurance in Design, Development, Production, Installation and Servicing - ISO 10013 Quality Manual Development Guide	
Place/Time/Purpose of Delivery: - Provide with proposal for project review - Provide updates to the project office 30 days after contract award for review	
Preparation Information: Prepare a Quality Manual addressing applicable requirements of AS9100; refer to ISO 10013 Quality Manual Development Guide for guidelines on preparation of a quality manual.	

DID 2-2 reporting of MRB actions

Title: Reporting of MRB Actions	CDRL No.: 2-2
Reference: MAR Paragraph 2.2.2	
Use: Report MRB actions to the project office.	
Related Documents: - SAE AS9100 Quality Systems - Aerospace - Model for Quality Assurance in Design, Development, Production, Installation and Servicing	
Place/Time/Purpose of Delivery: - Major MRB actions: Deliver to the project office within five (5) working days of MRB action for approval - Minor MRB actions: Deliver to the project office within five (5) working days of MRB action for review	
Preparation Information: The developer shall document relevant information on a developer MRB form that includes at least the following: - Identification of project, system, or sub-system - Identification of item (e.g., assembly, sub-assembly, or part, to include serial number or part number as applicable) - Description of affected item - Definition of major and minor nonconformances - Identification of next higher assembly - Description of anomaly, including activities leading up to the anomaly - Names and contact information of involved individuals - Status of item - Contact information for personnel who originated the report - Date of original submission to the MRB - Actions taken after approval	

DID 2-3 Request for a deviation or waiver

Title: Request for a deviation or waiver	CDRL No.: 2-3
Reference: MAR Paragraph 2.2.2	
Use: Request project approval of a deviation or waiver.	
Related Documents: - SAE AS9100 Quality Systems - Aerospace - Model for Quality Assurance in Design, Development, Production, Installation and Servicing	
Place/Time/Purpose of Delivery: - Deliver to the Project Office within five (5) working days of identifying the need for a deviation or waiver for approval	
Preparation Information: The developer shall identify the requirements that apply to the product and provide specific information regarding the noncompliance of the product with the requirements. The developer shall identify the effect of the proposed noncompliance on product performance at higher levels of assembly.	

DID 2-4 anomaly Report

Title: Anomaly Report	CDRL No.: 2-4
Reference: MAR Paragraph 2.2.3	
Use: Document anomalies, investigative activities, rationale for closure, and corrective and preventive actions.	
Related Documents: - SAE AS9100 Quality Systems - Aerospace - Model for Quality Assurance in Design, Development, Production, Installation and Servicing	
Place/Time/Purpose of Delivery: - Deliver initial submission to the project office within 24 hours of occurrence for information - Deliver notice of a change in status within 24 hours of occurrence for information - Deliver the proposed closure to the project office prior to closure for approval	
Preparation Information: Document anomalies, changes in status, or proposed closure to identify the following information: - Identification of project, system, or sub-system - Identification of failed item (e.g., assembly, sub-assembly, or part) - Description of item - Identification of next higher assembly - Description of anomaly, including activities leading up to anomaly, if known - Names and contact information of individuals involved in anomaly - Date and time of anomaly - Status of item - Contact information for personnel who originated the report - Date of original submission - Anomaly cause - Corrective actions implemented - Retesting performed and results - Other items affected - Risk ratings—mission impact and certainty in corrective actions	

DID 3-1 System Safety Program Plan

Title: System Safety Program Plan	CDRL No.: 3-1
Reference: MAR Paragraph 3.1	
Use: The System Safety Program Plan(SSPP) describes the tasks and activities of system safety management and engineering required to identify, evaluate, and eliminate or control hazards to the hardware, software, and system design by reducing the associated risk to an acceptable level throughout the system life cycle, including launch range safety requirements.	
Related Documents: NPR 8715.3 NASA General Safety Program Requirements NPR 8715.7 Expendable Launch Vehicle Payload Safety Program	
Place/Time/Purpose of Delivery: - Deliver to the Project Office forty five(45) days prior to PDR for approval - To be delivered to the launch range within thirty (30) days of delivery to Project Office for approval	

Preparation Information:

The developer shall prepare a SSPP that describes the development and implementation of a system safety program that complies with the requirements of NPR 8715.3, NPR 8715.7, the launch service provider, and launch range safety. The developer shall

- Define the roles and responsibilities of personnel
- Define the required documentation, applicable documents, and completion schedules for analyses, reviews, and safety packages
- Address support for Reviews, Safety Working Group Meetings and TIMs
- Provide for early identification and control of hazards to personnel, facilities, support equipment, and the flight system during product development, including design, fabrication, test, transportation, and ground activities.
- Address compliance with the launch range safety requirements
- Include a safety review process that meets the requirements of NASA-STD-8715.7 Expendable Launch Vehicle Payloads Safety Program
- Address compliance with industrial safety requirements imposed by NASA and OSHA design and operational needs (e.g., NASA-STD-8719.9 Lifting Devices and Equipment) and contractually imposed mission unique obligations

- Address software safety so as to identify and mitigate safety-critical software products in compliance with NASA-STD-8719.13 NASA Software Safety Standard by the following:
  - Identification of software related hazards
  - Identification of hazard controls that are implemented with software
  - Identification and tracking of software safety requirements
  - Verification results and approved waivers and exceptions for software safety requirements
  - Verification of safety discrepancy disposition approvals

DID 3-2 Safety Procedures for Payload I&T

Title: Hazardous Procedures for Payload I&T and Pre-launch Processing	CDRL No.: 3-2
Reference: MAR Paragraph 3.1.2	
Use: Documents hazardous procedures and associated safeguards that the developer will use for integration and test activities and pre-launch activities that comply with the applicable safety requirements of the installation where the activities are performed.	
Related Documents: - GSFC 500-PG-8715.1.2 AETD Safety Manual (for GSFC I&T operations) - AFSPCMAN 91-710, Range Safety User Requirements - KNPR 8715.3, KSC Safety Practices Procedural Requirements -	
Place/Time/Purpose of Delivery: - Submit Payload I&T Hazardous Procedures to the Project Office seven (7) days before first use for approval - Submit Launch Range Hazardous Procedures to the Project Office sixty (60) days prior to first use for approval - After Project Office approval, submit Launch Range Hazardous Procedures to Range Safety forty-five (45) days prior to first use for approval	

DID 3-3 Safety Requirements Compliance Checklist

Title: Safety Requirements Compliance Checklist	CDRL No.: 3-3
Reference: MAR Paragraph 3.2.1	
Use: The checklist indicates for each requirement whether the proposed design is compliant, non-compliant but meets intent, non-compliant, or if the requirement is not applicable. An indication other than compliant will include rationale. Note: the developer shall submit safety waivers for non-compliant design elements per paragraph 3.2.6 and DID 3-11.	
Related Documents: - AFSPCMAN 91-710, Range Safety User Requirements - Reference MAR Section 3.1.1, Mission Related Safety Requirements Documentation	
Place/Time/Purpose of Delivery: - Deliver to the Project Office thirty (30) days prior to PDR for approval	
Preparation Information: The developer shall prepare a compliance checklist of all design, test, analysis, and data submittal requirements. The following shall be included: - Criteria and requirement. - System - Indication of compliance, noncompliance, or not applicable - Resolution - Reference - Copies of all Range Safety approved non-compliances including waivers and equivalent levels of safety certifications	

DID 3-4 preliminary HAZARD ANALYSIS

Title: Preliminary Hazard Analysis	CDRL No.: 3-4
Reference: MAR Paragraph 3.2.2.1	
Use: The Preliminary Hazard Analysis (PHA) is used to obtain an initial risk assessment and identify safety critical areas of a concept or system. It is based on the best available data, including mishap data from similar systems and other lessons learned. The developer shall evaluate hazards associated with the proposed design or function for severity, probability, and operational constraints. The developer shall identify safety provisions and alternatives that are needed to eliminate hazards or reduce their associated risk to an acceptable level.	
Related Documents: - AFSPCMAN 91-710, Range Safety User Requirements - NPR 8715.3, NASA General Safety Program Requirements - MIL-STD-882, Standard Practice for System Safety	
Place/Time/Purpose of Delivery: - Submit the PHA with the MSPSP to the Project Office no later than thirty (30) days after mission PDR for approval	

DID 3-5 OPERATIONS HAZARD ANALYSIS

Title: Operations Hazard Analysis	CDRL No.: 3-5

Reference:
MAR Paragraph 3.2.2.2

Use:
The operations hazard analysis (OHA) shall demonstrate that hazards related to the operation of hardware and test equipment during integration and test activities have been addressed with respect to facility safety requirements.

Related Documents:

- GSFC 500-PG-8715.1.2 AETD Safety Manual (for operations at GSFC)
- NASA-STD-8719.9 Standard for Lifting Devices and Equipment

Place/Time/Purpose of Delivery:

- Deliver the OHA and Hazard Tracking Log to the Project Office forty-five (45) days prior to PER for approval

Preparation Information:

The OHA shall include the following information:

- Introduction – a summary of the major findings of the analysis and the proposed corrective actions and definitions of special terms, acronyms, and abbreviations.
- System Description – a description of system hardware and configuration, with a list of subsystem components and schedules for integration and testing
- Analysis of Hazards
- List of real or potential hazards to personnel, equipment, and property during I&T processing
- The following information shall be included for each hazard:
    - System Component/Phase – the phase and component with which the analysis is concerned; e.g., system, subsystem, component, operating/maintenance procedure, or environmental condition.
    - System Description and Hazard Identification, Indication:
        - A description of expected results from operating the component/subsystem or performing the operating/maintenance action
        - A complete description of the actual or potential hazard resulting from normal actions or equipment failures; indicate whether the hazard will cause personnel injury and equipment damage.
        - A description of crew indications that include means of identifying the

hazard to operating or maintenance personnel.
    - A description of the safety hazards of software controlling hardware systems where the hardware effects are safety critical.
  - Effect on System – the detrimental effects of an uncontrolled hazard on the system
  - Risk Assessment.
  - Caution and Warning Notes – a list of warnings, cautions, procedures required in operating and maintenance manuals, training courses, and test plans
  - Status/Remarks – the status of actions to implement hazard controls.
- References (e.g., test reports, preliminary operating and maintenance manuals, and other hazard analyses)

DID 3-6 OPERATING AND SUPPORT HAZARD ANALYSIS

Title:	CDRL No.:
Operating and Support Hazard Analysis (O&SHA)	3-6

Reference:

MAR Paragraph 3.2.2.3

Use:

The Operating & Support Hazard Analysis (O&SHA) addresses the implementation of safety requirements for personnel, procedures, and equipment used during testing, transportation, storage, and integration operations at the launch site.

Related Documents:

- AFSPCMAN 91-710, Range Safety User Requirements
- NPR 8715.3, NASA General Safety Program Requirements

Place/Time/Purpose of Delivery:

- Deliver the results of the O&SHA to the Project Office as a part of the MSPSP (DID 3-7)

DID 3-7INSTRUMENT SAFETY ASSESSMENT REPORT

Title: Instrument Safety Assessment Report (ISAR)	CDRL No.: 3-7
Reference: MAR Paragraph 3.2.3	
Use: The Instrument Safety Assessment Report (ISAR) documents the comprehensive evaluation of the risk being assumed prior to the testing or operation of an instrument. The spacecraft developer will use the ISAR as an input to the Missile System Pre-launch Safety Package (MSPSP).	
Related Documents: - AFSPCMAN 91-710, Range Safety User Requirements - JSC 26943 Guidelines for the Preparation of Payload Flight Safety Data Packages and Hazard Reports -	
Place/Time/Purpose of Delivery: - Deliver the Preliminary ISAR to the Project Office thirty (30) days after instrument PDR for approval - Deliver the Intermediate ISAR to the Project Office thirty (30) days prior to instrument CDR for approval - Deliver the Final ISAR to the Project Office thirty (30) days prior to instrument PSR for approval	
Preparation Information: The Safety Assessment Report will identify safety features of the hardware, software, and system design as well as procedural, hardware, and software related hazards that may be present in the instrument. This includes specific procedural controls and precautions that should be followed. The Safety Assessment Report will include the following information: - The safety criteria and methodology used to classify and rank hazards, including assumptions upon which the criteria or methodologies were based or derived, to include the definition of acceptable risk as specified by Range Safety - The results of hazard analyses and tests used to identify hazards in the system including: - Those hazards that still have a residual risk and the actions that have been taken to reduce the associated risk to a level contractually specified as acceptable - Results of tests conducted to validate safety criteria, requirements, and analyses - Hazard reports documenting the results of the safety program efforts to include a list of all significant hazards along with specific safety recommendations or precautions required to ensure safety of personnel, property, or the environment. NOTE: Categorize the list as to whether or not the risks may be expected under normal or abnormal operating conditions. - Any hazardous materials generated by or used in the system	

- The conclusion, including a signed statement, that all identified hazards have been eliminated or their associated risks controlled to levels contractually specified as acceptable and that the system is ready to test, operate, or proceed to the next phase
- In order to aid the spacecraft developer in completing an orbital debris assessment of the instrument it is necessary to identify any stored energy sources in instruments (pressure vessel, Dewar, etc.) as well as any energy sources that can be passivated at end of life.
- Recommendations applicable to hazards at the interface of Range User systems with other systems, as required
- Software Safety Analysis

DID 3-8 VERIFICATION TRACKING LOG

Title: Verification Tracking Log	CDRL No.: 3-8

Reference:
MAR Paragraph 3.2.3

Use:
Provides documentation of a Hazard Control and Verification Tracking process as a closed-loop system to ensure that safety compliance has been satisfied in accordance to applicable launch range safety requirements.

Related Documents:
- AFSPCMAN 91-710, Range Safety User Requirements
- KHB 1700.7, Space Shuttle Payload Ground Safety Handbook
-

Place/Time/Purpose of Delivery:
- The Verification Tracking Log (VTL) that identifies hazard controls that are not verified as closed shall be delivered to the Project Office with the final MSPSP DID (3-7) for review
- Regular updates to this log shall be provided to the Project Office for review until all hazard controls are verified as closed.

Note: the developer shall close items with the appropriate rationale prior to first operational use or restraint.

Preparation Information:

The VTL provides documentation that demonstrates the process of verifying the control of all hazards by test, analysis, inspection, similarity to previously qualified hardware, or any combination of these activities. All verifications that are listed on the hazard reports shall reference the tests/analyses/inspections. Results of these tests/analyses/inspections shall be available for review and submitted in accordance with the contract schedule and applicable launch site range safety requirements.

The VTL shall contain the following information in tabular format:
- Hazard Report #
- Safety Verification #
- Description (Identify procedures/analyses by number and title)
- Constraints on Launch Site Operations
- Independent Verification Required (e.g., mandatory inspection points)
- Scheduled Completion Date
- Completion Date
- Method of Closure

DID 3-9 SAFETY variance (12-30-2008)

Title: Safety Variance	CDRL No.: 3-9

Reference:
MAR Paragraph 3.2.5

Use:
A Safety Variance documents a safety requirement that cannot be met and the rationale for approval of a waiver, exception, or deviation as defined in NPR 8715.3. Note: a variance may require Range Safety concurrence.

Related Documents:

- AFSPCMAN 91-710, Range Safety User Requirements
- NASA Non-Compliance Report/Corrective Action System (NCR/CAS) Web-based Online System
- NPR 8715.3, NASA General Safety Program Requirements

Place/Time/Purpose of Delivery:

- Deliver to the Project Office within thirty (30) days of identifying the need for a variance for approval.

Preparation Information:

The developer shall include the following information from the review of a variance request:

- A statement of the specific safety requirement and its associated source document name and paragraph number for which a variance is requested.
- A technical justification for the variance.
- Analyses to show the mishap potential of the proposed alternate requirement, method, or process as evaluated against the specified requirement.
- An assessment of the risk involved in accepting the variance; when it is determined that there are no hazards, the basis for such determination should be provided.
- A narrative on possible ways of reducing hazards severity and probability and existing compliance activities.
- Starting and expiration dates for variance, if applicable.

DID 3-10 ORBITAL DEBRIS ASSESSMENT

Title: Orbital Debris Assessment	CDRL No.: 3-10
Reference: MAR Paragraph 3.2.6	
Use: Ensure NASA requirements for post mission orbital debris control are met.	
Related Documents: - NPR 8715.6A NASA Procedural Requirements for Limiting Orbital Debris - NASA-STD-8719.14 Process for Limiting Orbital Debris	
Place/Time/Purpose of Delivery: - Deliver preliminary assessment to the Project Office fifteen (15) days prior to mission PDR for review - Deliver final package to the Project Office sixty (60) days prior to mission CDR for approval - Deliver updates the final package to the Project Office within thirty (30) days of identification of design changes that affect the assessment for approval	
Preparation Information: The assessment shall be done in accordance with NPR 8715.6 NASA Procedural Requirements for Limiting Orbital Debris and NASA-STD-8719.14 Process for Limiting Orbital Debris. The preliminary assessment is conducted to identify areas where the project may contribute debris and to assess this contribution relative to the guidelines. The final assessment is conducted shall include comments on changes made since the preliminary assessment. The detail should be consistent with the available information of design and operations. The developer shall submit updates to the final assessment for design changes after CDR that impact the potential for debris generation. NOTE: Orbital Debris Assessment Software is available for download from Johnson Space Center at URL: http://sn-callisto.jsc.nasa.gov/mitigate/das/das.html	

DID 3-11 Mishap Preparedness and Contingency Plan

Title: Mishap Preparedness and Contingency Plan	CDRL No.: 3-11
Reference: MAR Paragraph 3.2.7	
Use: Ensure that requirements for mishap reporting are met.	
Related Documents: - NPR 8621.1, NASA Procedural Requirements for Mishap Reporting, Investigating, and Recordkeeping	
Place/Time/Purpose of Delivery: - Deliver to the Project Office thirty (30) days prior to mission PDR for review	
Preparation Information: The developer shall prepare a Mishap Preparedness and Contingency Plan per the requirements of NPR 8621.1	

DID 3-12MATERIAL SELECTION LIST FOR PLASTIC FILMS, FOAMS, AND ADHESIVE TAPES

Title: Material Selection List for Plastic Films, Foams, and Adhesive Tapes	CDRL No.: 3-12
Reference: MAR Paragraph 3.2.8	
Use: Submitted to Launch Range Safety for assessment of flammability.	
Related Documents: - KTI-5212Material Selection List for Plastic Films, Foams, and Adhesive Tapes	
Place/Time/Purpose of Delivery: - Deliver to the Project Office with the Final MSPSP (DID 3-7) for review	
Preparation Information: - The developer shall complete form KTI-5212Material Selection List for Plastic Films, Foams, and Adhesive Tapes	

DID 3-13RADIATION FORMS AND ANALYSES

Title: Radiation Forms and Analyses	CDRL No.: 3-13
Reference: MAR Paragraph 3.2.8	
Use: The forms and analyses support the NASAlaunch safety approval process	
Related Documents: - KNPR 1860.1 KSC Ionizing Radiation Protection Program - KNPR 1860.2 KSC Non-Ionizing Radiation Protection Program	
Place/Time/Purpose of Delivery: - Deliver to the Project Office with the Final MSPSP (DID 3-7) for review	
Preparation Information: The developer shall prepare the following forms per the requirements of NPR 8715.3: - KSC FORM 16-294 NS Radiation Training and Experience Summary (Ionizing Radiation) - KSC FORM 16-295 NS Radiation Use Request/Authorization (Radiation Materials) - KSC FORM 16-447 Laser Device Use Request/Authorization - KSC FORM 16-450 NS Radiation Training & Experience Summary (Non-ionizing Radiation) - KSC FORM 16-451 NS Radio Frequency/Microwave System Use Request/ Authorization	

DID 3-14 Process Waste Questionnaire

Title: - Process Waste Questionnaire	CDRL No.: 3-14
Reference: MAR Paragraph 3.2.8	
Use: The forms and analyses support the NASAlaunch safety approval process	
Related Documents:	
Place/Time/Purpose of Delivery: - Deliver to the Project Office with the Final MSPSP (DID 3-7) for review	
Preparation Information - The developer shall complete KSC Form 26-551V2 Process Waste Questionnaire.	

DID 3-15 Environmental Impact Statement

Title: Environmental Impact Statement	CDRL No.: 3-15
Reference: MAR Paragraph 3.2.8	
Use: The forms and analyses support the NASAlaunch safety approval process	
Related Documents:	
Place/Time/Purpose of Delivery: - Deliver to the Project Office with the Final MSPSP (DID 3-7) for review	
Preparation Information - The developer shall complete AF Form 813 Request for Environmental Impact Analysis.	

DID 4-1 Probabilistic Risk assessment (PRA) and Reliability Program Plan

Title: PRA and Reliability Program Plan	CDRL No.: 4-1
Reference: MAR Paragraph 4.1	
Use: Planning and implementation of Probabilistic Risk Assessment (PRA) and reliabilityactivities.	
Related Documents: - NPD 8720.1, NASA Reliability and Maintainability (R&M) Program Policy - NASA-STD-8729.1, Planning, Developing and Managing an Effective Reliability and Maintainability (R&M) Program. - NPR 8705.4 Risk Classification for NASA Payloads - NPR 8705.5 PRA Procedures for NASA Programs and Projects	
Place/Time/Purpose of Delivery: - Deliver draft plans to the Project Office sixty (60) days after contract award for review - Deliver final plans to the Project Office thirty (30) days prior to the Systems Requirements Review for approval - Deliver activity reports related to implementation of the plans at milestone reviews beginning with the Systems Requirements Review for review	
Preparation Information: The PRA and Reliability Program Plan shall include: - A discussion of how the developer intends to implement and comply with PRA and Reliability program requirements. - Charts and statements describing organizational responsibilities and functions conducting each task to be performed as part of the Program. - A summary (matrix or other brief form) that indicates for each requirement, the organization responsible for implementing and generating the necessary documents. - Identify the approval, oversight, or review authority for each task. - Narrative descriptions, time or milestone schedules, and supporting documents describing the execution and management plan for each task. - Documentation, methods, procedures, and reporting specific to each task in the plan.	

DID 4-2: Probabilistic Risk Assessment

Title:	CDRL No.:
Probabilistic Risk Assessment	4-2

Reference:

MAR Paragraph 4.2

Use:

To provide a structured and disciplined approach to: analyzing system risk; supporting management decisions; improving safety, operations, performing maintenance and upgrades; improving performance; reducing costs.

Related Documents

- NPR 8705.4 Risk Classification for NASA Payloads
- NPR 8705.5 Probabilistic Risk Assessment (PRA) Procedures for NASA Programs and Projects
- NPR 8715.3 NASA General Safety Program Requirements
- PRA Procedures Guide for NASA Managers and Practitioners, (http://www.hq.nasa.gov/office/codeq/doctree/praguide.pdf)

Place/Time/Purpose of Delivery:

- Deliver interim report to the Project Office thirty (30) days prior to SRR for review.
- Deliver updated interim report to the Project Office thirty (30) days prior to CDR for review.
- Deliver updated interim report to the Project Office thirty (30) days prior to MOR for review.
- Deliver final report to the Project Office thirty (30) days prior to FOR for approval.

Preparation Information:

The PRA shall be performed in accordance with NPR 8705.5 and include the following:

- The objective and scope of the PRA
- End-states-of-interest to the decision-maker,
- Definition of the mission phases and success criteria,
- Initiating event categories,
- Top level scenarios,
- Initiating and pivotal event models (e.g., fault trees and phenomenological event models), including assessments of common cause failure modes
- Data development for probability calculations,
- Integrated model and quantification to obtain risk estimates,
- Assessment of uncertainties,
- Summary of results and conclusions, including a ranking of the lead contributors to risk.

DID 4-3: Failure Mode and Effects Analysis and Critical Items list

Title:	CDRL No.:
Failure Mode and Effects Analysis (FMEA) and Critical Items List (CIL)	4-3

Reference:

MAR Paragraph 4.3

Use:

Used to evaluate design against requirements, to identify single point failures and hazards, and to identify modes of failure within a system design for the early mitigation of potential catastrophic and critical failures.

Related Documents

- GSFC Flight Assurance Procedure, FAP P-322-208, Performing a Failure Mode and Effects Analysis
- NPR 8705.4 Risk Classification for NASA Payloads

Place/Time/Purpose of Delivery:

- Deliver preliminary FMEA to the Project Office thirty (30) days before PDR for review
- Deliver final FMEA to the Project Office thirty (30) days prior to CDR for approval
- Deliver updated FMEA and CIL to the Project Office thirty (days) prior to each subsequent milestone review leading up to Launch for approval

Preparation Information:

The FMEA Report shall include the following:

- A discussion of the approach of the analysis, methodologies, assumptions, results, conclusions, and recommendations.
- Objectives
- Level of the analysis
- Ground rules
- Functional description
- Functional block diagrams
- Reliability block diagrams
- Equipment analyzed
- Data sources used
- Problems identified
- Single-point failure analysis, to include the root cause, mitigation, and retention rationale for those with severity categories 1, 1R, 1S,2 or 2R.
- Corrective actions
- Work sheets identifying failure modes, causes, severity category, and effects at the item, next higher level, and mission level, detection methods, and mitigating provisions.

- Critical Items List (CIL) for severity categories 1, 1R, 1S, 2, and 2R, including item identification, cross-reference to FMEA line items, and retention rationale. Appropriate retention rationale may include design features, historical performance, acceptance testing, manufacturing product assurance, elimination of undesirable failure modes, and failure detection methods.

DID 4-4: Fault Tree Analysis Title: Fault Tree Analysis (FTA)	CDRL No.: 4-4

Reference:

MAR Paragraphs 4.4

Use:

Used to assess mission failure from the top level perspective. Undesired top-level states are identified and combinations of lower-level events are considered to derive credible failure scenarios. The technique provides a methodical approach to identify events or environments that can adversely affect mission success and provides an informed basis for assessing system risks.

Related Documents

- NASA Fault Tree Handbook with Aerospace Applications (http://www.hq.nasa.gov/office/codeq/doctree/fthb.pdf)
- NPR 8705.4 Risk Classification for NASA Payloads
- NPR 8715.3 NASA General Safety Program Requirements

Place/Time/Purpose of Delivery:

- Deliver preliminary qualitative mission FTA report to Project Office thirty (30) days prior to PDR for review.
- Deliver final qualitative mission FTA report to Project Office thirty (30) days prior to CDR for approval.
- Deliver qualitative mission FTA report to Project Office within thirty (30) days of updates/changes for approval.
- Deliver quantitative FTA report to Project Office in support of pivotal event analysis as part of each PRA report for approval

Preparation Information:

The instrument FTA Report shall contain:

- Analysis ground rules including definitions of undesirable end states
- References to documents and data used
- Fault tree diagrams
- Results and conclusions

Note: Separate FTA reports are not required for fault trees generated in support of pivotal event analysis in the PRA report.

DID 4-5: Parts Stress Analysis

Title: Parts Stress Analysis	CDRL No.: 4-5

Reference:
MAR Paragraph 4.5

Use:
Provides EEE parts stress analyses for verifying circuit design conformance to derating requirements; demonstrates that environmental operational stresses on parts comply with project derating requirements.

Related Documents
- GSFC EEE-INST-002 <http://nepp.nasa.gov/DocUploads/FFB52B88-36AE-4378-A05B2C084B5EE2CC/EEE-INST-002_add1.pdf>
- NASA Parts Selection List <http://nepp.nasa.gov/npsl/index.htm>

Place/Time/Purpose of Delivery:
- Deliver Parts Stress Analysis Report to Project Office forty-five (45) days prior to CDR for review
- Deliver revisions to Project Office within thirty (30) days of changes for review

Preparation Information:
The Parts Stress Analysis Report shall contain:
- Analysis ground rules
- Reference documents and data used
- Results and conclusions including:
    - Design trade study results
    - Parts stress analysis results impacting design or risk decisions
- Analysis worksheets; the worksheets at a minimum shall include:
    - Part identification (traceable to circuit diagrams)
    - Assumed environmental (consider all expected environments)
    - Rated stress
    - Applied stress (consider all significant operating parameter stresses at the extremes of anticipated environments)
    - Ratio of applied-to-rated stress

DID 4-6: Worst Case Analysis

Title: Worst Case Analysis	CDRL No.: 4-6

Reference:
MAR Paragraph 4.6

Use:
Demonstrate design margins in electronic and electrical circuits, optics, and electromechanical and mechanical items.

Related Documents
- NPD 8720.1, NASA Reliability and Maintainability (R&M) Program Policy.
- NASA-STD-8729.1, Planning, Developing and Managing an Effective R&M Program.
- NPR 8705.4, Risk Classification for NASA Payloads

Place/Time/Purpose of Delivery:
- Deliver Worst Case Analysis Report to Project Office thirty (30) days prior to CDR for review
- Deliver revisions to Worst Case Analysis Report to Project Office within thirty (30) days for review

Preparation Information:
The Worst Case Analysis Report shall include the following:

- Address worst case conditions performed on each component.
- Discuss how each analysis includes the mission life.
- Discuss consideration of critical parameters at maximum and minimum limits.
- The effect of environmental stresses on the operational parameters being evaluated.

DID 4-7: Reliability Assessments and Predictions

Title: Reliability Assessments and Predictions	CDRL No.: 4-7
Reference: MAR Paragraph 4.7	
Use: Used to assist in evaluating alternative designs and to identify potential mission limiting elements that may require special attention.	
Related Documents: - IEEE Standard Methodology for Reliability Prediction and Assessment for Electronic Systems and Equipment – Std 1413 - RADC-TR-85-229, Reliability Prediction for Spacecraft	
Place/Time/Purpose of Delivery: - Deliver reliability assessment methodology to Project Office thirty (30) days prior to System Requirements Review for review - Deliver initial report to Project Office thirty (30) days prior to PDR for review - Deliver final report to Project Office thirty (30) days prior to CDR for review	
Preparation Information: The Reliability Assessment and Prediction Report shall include the following: - The methodology and results of comparative reliability assessments including mathematical models - Reliability block diagrams - Failure rates - Failure definitions - Degraded operating modes - Trade-offs - Assumptions - Any other pertinent information used in the assessment process - A discussion to show reliability was considered as a discriminator in the design process	

DID 4-10 LIMITED-LIFE ITEMS LIST

Title: Limited-Life Items List	CDRL No.: 4-8
Reference: MAR Paragraph 4.11	
Use: Tracks the selection and application of limited-life items and the predicted impact on mission operations	
Related Documents	
Place/Time/Purpose of Delivery: - Deliver Limited-Life Items List to the Project Office thirty (30) days prior to PDR for approval - Deliver updates to the Project Office no later than thirty (30) days after changes are made for approval	
Preparation Information: The developer shall prepare and maintain a list of life-limited items and their predicted impact on mission operations. The list shall include expected life, required life, duty cycles, and rationale for selecting and using the item. The list may include such items as structures, thermal control surfaces, solar arrays, electromechanical mechanisms, batteries, compressors, seals, bearings, valves, tape recorders, momentum wheels, gyros, actuators and scan devices. The environmental or application factors that may affect the items include such things as atomic oxygen, solar radiation, shelf-life, extreme temperatures, thermal cycling, wear and fatigue.	

DID 5-1: Software Quality Assurance Plan

Title: Software Quality Assurance Plan	CDRL No.: 5-1

Reference:
MAR Paragraph 5.2

Use:
Documents the developers Software Quality Assurance roles and responsibilities, surveillance activities, supplier controls, record collection, maintenance and retention, training, and risk management.

Related Documents:
- IEEE Standard 730-2002, Software Quality Assurance Plans
- NASA-STD-8739.8, NASA Standard for Software Assurance

Place/Time/Purpose of Delivery:
- Deliver preliminary plan to the Project Office thirty (30) days after the beginning of Phase B for review
- Deliver baseline planto the Project Office fifteen (15) days prior to PDR for approval
- Deliver updates to the Project Office fifteen (15) days prior to implementation for approval

Preparation Information:
The Software Quality Assurance Plan (SAP) shall follow the format:
- Purpose
- Reference documents and definitions
- Management
- Documentation
- Standards, practices, conventions, and metrics
- Software Reviews
- Test
- Problem Reporting and Corrective Action
- Tools, techniques, and methodologies
- Media control
- Supplier control
- Records, collection, maintenance, and retention
- Training
- Risk Management
- SQAP Change procedure and history

DID 5-2: Software VERIFICATION & VALIDATION PLAN

Title: Software Verification & Validation Plan	CDRL No.: 5-2

Reference:
MAR Paragraph 5.3

Use:
Documents the software V&V process that determines whether the development products of a given activity conform to the requirements of that activity and whether the software satisfies its intended use and user needs. This determination may include analysis, evaluation, review, inspection, assessment, and testing of the software products and processes. Please note that the V&V process should be performed in parallel with the software development, not at the conclusion of the development effort.

Related Documents:
- NPR 7150.2, NASA Software Engineering Requirements
- IEEE Standard 1012-2004, Software Verification & Validation
- NASA-STD-8739.8, NASA Standard for Software Assurance
- IEEE Std 1059-1993, IEEE Guide for Software Verification and Validation Plans

Place/Time/Purpose of Delivery:
- Preliminary document delivered to Project Office thirty (30) days after Phase B start for review
- Baseline document delivered to Project Office fifteen (15) days prior to SRR for approval
- Provide updates to the Project Office fifteen (15) prior to implementation for approval

Preparation information:
- Purpose
- Referenced documents
- Definitions
- V&V Overview
  - Organization
  - Master Schedule
  - Software integrity level scheme
  - Resource summary
  - Responsibilities
  - Tools, techniques, and methods
- V&V Processes
  - Process: Management
    - Activity: Management of V&V
  - Process: Acquisition
    - Activity: Acquisition of support V&V
  - Process: Supply
    - Activity: Planning V&V
  - Process: Development

        - Activity: Concept V&V
        - Activity: Requirements V&V
        - Activity: Design V&V
        - Activity: Implementation V&V
        - Activity: Test V&V
        - Activity: Installation and Checkout V&V
    - Process: Operations
        - Activity: Operations V&V
    - Process: Maintenance
        - Activity: Maintenance V&V
- V&V Reporting Requirements
    - Tasks reports
    - Activity: summary reports
    - Anomaly reports
    - V&V final reports
    - Special studies reports (optional)
    - Other reports (optional)
- V&V Administrative requirements
    - Anomaly resolution and reporting
    - Task iteration policy
    - Deviation policy
    - Control procedures
    - Standards, practices, and conventions
- V&V test documentation requirements

DID 5-3: Software Configuration Management Plan

Title: Software Configuration Management Plan	CDRL No.: 5-3

Reference:
MAR Paragraph 5.5

Use:
The purpose of the Software Configuration Management Plan is to define the software configuration management system, roles and responsibilities, activities, schedules, resources, and plan maintenance.

Related Documents:
- ANSI-IEEE Standard 828-1998, IEEE Standard for Software Configuration Management Plans
- ANSI-IEEE Standard 1042-1987, Guide to Software Configuration Management
- NPR 7150.2, NASA Software Engineering Requirements

Place/Time/Purpose of Delivery:
- Deliver preliminary planto the Project Office thirty (30) days after contract award for review
- Deliver baseline planto the Project Office fifteen (15) days prior to SRR for approval
- Deliver updates to the plan to the Project Office fifteen (15) days prior to implementation for approval

Preparation Information:
The developer shall develop, maintain, manage, and implement a Software Configuration Management (SCM) system that provides baseline management and control of software requirements, design, source code, data, and documentation. The SCM system shall be applied to all deliverables and designated non-deliverable software products. The developer shall document the SCM system, and associated tools, within the plan. The plan shall address configuration identification, configuration control, configuration status accounting, and configuration audits and reviews.

As part of SCM, the developer will employ a source code version control tool (e.g., ClearCase, Starbase) that allows developers to check in/check out current or previous versions of a source file. The developer will also use a requirements management tool (e.g., DOORS) to manage the software requirements baseline. The developer will document and implement a process for Software Problem Reporting and Corrective Action that addresses reporting, analyzing, and tracking software non-conformances throughout the development lifecycle. Software Problem Reporting can be included as part of developers overall project Problem Reporting and Corrective Action Plan.

The Software Configuration Management (SCM) Plan shall follow the following format:
- Introduction – Purpose, scope, definitions and references.
- SCM Management Overview – Organization, responsibilities, and interfaces and relationships to software life cycle.
- Software Configuration Management Activities: 1) Configuration Identification, 2) Configuration Control, 3) Configuration Status Accounting, 4) Configuration Audits, 5) Interface Control, 6) Subcontractor control.
- Software Configuration Management Schedules.

- Software Configuration Management Resources – tools, techniques, equipment, personnel, and training.
- Software Configuration Management Plan Maintenance.

Note: SCM Plan may be contained in developer Project CM Plan or Software Management Plan.

DID 5-4: Software Version Description Document

Title: Software Version Description Document (VDD)	CDRL No.: 5-4

Reference:
MAR Paragraph 5.7

Use:
A Version Description Document (VDD) is the primary configuration control document used to track and control versions of software released to testing, implementation, or the final operational environment. The VDD identifies and documents the version of the computer software configuration items (CSCI's) and other deliverables that comprise the software build or release, including changes since the last VDD was issued.

Related Documents:
- NPR 7150.2, NASA Software Engineering Requirements – Section 5.2.8

Place/Time/Purpose of Delivery:
- Deliver to the Project Office with each build or release for information

Preparation Information:
The Version Description Document shall include/address:
- Established Baseline – identifies the delivered system and software (e.g., type, version numbers, release numbers, date, and location)
- New Features and/or Requirements Implemented and Delivered
- Planned Features Absent from this version
- List of Outstanding Change Requests (CRs), Discrepancy Reports (DRs), and workarounds (if applicable) against this release
- List of CRs and DR's implemented since the previous version
- Any Significant Changes in Operations
- Applicable Documents associated with this release (e.g., user guides)
- Installation instructions on how to build the system (including tools, operating systems, assemblers, compilers, libraries, existing software, data files, and delivered software). Note: All version numbers should be provided.
- Information from any Configuration Audits performed prior to the delivery (to ensure that the correct versions were delivered with the correct functionality)

DID 5-5: Software Status Report

Title: Software Status Report	CDRL No.: 5-5

Reference:
MAR Paragraph 5.8

Use:
Software Assurance Status Report provides information regarding current status and future activities.

Related Documents:
- ANSI-IEEE Standard 828-1998, IEEE Standard for Software Configuration Management Plans
- ANSI-IEEE Standard 1042-1987, Guide to Software Configuration Management
- NPR 7150.2, NASA Software Engineering Requirements
-

Place/Time/Purpose of Delivery:
- Deliver to Project Office monthly beginning sixty (60) days after contract award for information

Preparation Information:
As part of the Project Monthly Status Reports, the developer shall include the following software assurance activities:
- Organization and key personnel changes
- Assurance accomplishments and resulting software assurance metrics (e.g., for activities such as inspection and test, reviews, contractor/subcontractor surveys, and audits)
- Subcontractor assurance accomplishments
- Trends in software quality metric data (e.g., total number of software problem reports, including the number of problem reports that were opened and closed in that reporting period)
- Significant problems or issues
- Plans for upcoming software assurance activities
- Lessons Learned

DID 6-1 Ground Systems Mission Assurance Implementation Plan

Title: Ground Systems Mission Assurance Implementation Plan	CDRL No.: 6-1
Reference: **MAR PARAGRAPH 6.1**	
Use: Documents the developer's mission assurance implementation plan for ground systems.	
RELATED DOCUMENTS: - NASA-STD-8719.9 Standard for Lifting Devices and Equipment - GSFC-STD-1000 Rules for the Design, Development, Verification, and Operation of Flight Systems	
Place/Time/Purpose of Delivery: - Deliver to Project Office thirty (30) days after contract award for approval	
Preparation Information: The developer's plan shall address the ground systems and equipment requirements with respect to procurement, development, test, operation, and maintenance for both ground systems and flight systems. The plan shall address support to flight items to the extent necessary to assure functional integrity of flight items, including health and safety.	

DID 6-2 Ground Support Equipment Plan

Title: Ground Support Equipment Plan	CDRL No.: 6-2

Reference:
MAR Paragraph 6.2

Use:
Documents the developer's plan for ground support equipment that will be used in the development of ground operations equipment and flight items.

Related Documents:
- NASA-STD-8719.9 Standard for Lifting Devices and Equipment
- GSFC-STD-1000 Rules for the Design, Development, Verification, and Operation of Flight Systems

Place/Time/Purpose of Delivery:
- Deliver to the project office thirty (30) days prior to System Requirements Review for approval

Preparation Information:
The developer shall document a plan that:
- Identifies GSE functions necessary to develop and test flight and ground operations items
- Develops and builds the GSE

The program shall address:
- Requirements definition, management, traceability, and verification
- Verification and validation
- Acceptance criteria for testing
- Configuration control (functional and physical)
- Interface control drawings
- Critical Interfaces
- Testing—unit testing, integration and test, system level, acceptance test, interface, end-to-end testing, compatibility testing, data flow testing, mission simulations, regression testing and operational readiness testing.
- User/operational manuals
- Mechanical stress analysis
- Items that directly interface with flight items and are required to be built and maintained to the same standards
- Analyses required to prevent induced damage to flight items

DID 6-3 Ground Operations Equipment Plan

Title: Ground Operations Equipment Plan	CDRL No.: 6-3
Reference: MAR Paragraph 6.3	
Use: Documents the developer's plans for developing, building, and maintaining ground operations equipment to support launch and flight operations.	
Related Documents:	
Place/Time/Purpose of Delivery: - Deliver to the GSFC Project Office fifteen (15) days prior to mission PDR for review - Deliver to the GSFC Project Office fifteen (15) days prior to mission CDR for approval	
Preparation Information: The developer shall address the following: - Functions necessary to support launch and flight operations - Requirements definition, management, traceability, and verification - Verification and validation - Acceptance criteria - Configuration control (functional and physical) - Interface control drawings - Critical Interfaces - Testing—unit testing, integration and test, system level, acceptance test, interface, end-to-end testing, compatibility testing, data flow testing, mission simulations, regression testing and operational readiness testing. - User/operational manuals - Control center and flight operations Failure Modes and Effects Analysis - Software Code walkthroughs and reviews - Trend data - Controls to prevent actions or events that threaten mission success - Equipment Failures - Control center availability (redundancy, repair, spares, sparing) - Contingency plans and procedures - Acceptance testing, end-to-end, compatibility testing, data flow and operational readiness testing, including appropriate support from ground data system elements to demonstrate operational compatibility of system to perform as required	

DID 7-1 Risk Management Plan

Title: Risk Management Plan	CDRL No.: 7-1
Reference: MAR Paragraph 7.1	
Use: Defines the process by which the developer identifies, evaluates, and mitigates the risks associated with program, project, and/or mission goals	
Related Documents: - NPR 8000.4, Risk Management Procedures and Guidelines	
Place/Time/Purpose of Delivery: - Deliver to the Project Office sixty (60) after contract award for approval	

Preparation Information:

The Risk Management Plan shall include:

- Description of contract requirements
- Purpose and Scope
- Assumptions, Constraints, and Policies
- Related Documents and Standards
- Risk Management Process Summary (Philosophy, Integration)
- Risk Management Organization
  - Roles and Responsibilities
  - Risk Management Review Board
  - Standard Practices
  - Communication
- Risk Attributes that will be used to classify risks
  - As a minimum attributes shall be defined for safety, cost, schedule, and technical or performance areas
- Risk buy-down chart (waterfall chart)
- Criteria for prioritization of risks
- Mitigation plan content
- Process Details
  - Baselines
  - Database (Use, Access, Updates, Responsibilities, etc.)
  - Identifying Risks
  - Analyzing Risks
  - Planning, Actions
  - Tracking (metrics and their use)
  - Control
  - Documentation and Reporting

DID 7-2 Risk list

Title: Risk List	CDRL No.: 7-2
Reference: MAR Paragraph 7.2	
Use: Defines the documentation and reporting of risk items.	
Related Documents: - GID 7120.2 GSFC 5x5 Risk Matrix - NPR 8000.4, Agency Risk Management Procedural Requirements	
Place/Time/Purpose of Delivery: - Deliver to the Project Office fifteen (15) days prior to each milestone reviews beginning with PDR for review	

Preparation Information:
Prepare a prioritized list of risks that includes
- Identification number
- Title
- Current approach (mitigate, watch, accept, research)
- Rank
- Trend
 	
Prepare a chart for each risk that includes:
- Identification number
- Title
- Rank
- Risk statement (condition-consequence form)
- Brief discussion of:
  - Current approach
  - Actions causing change
  - Current status	

DID 8-1 Systems Review Materials

Title: Systems Review Materials	CDRL No.: 8-1
Reference: MAR Paragraph 8.1	
Use: To provide the systems review team with the materials used to conduct the review.	
Related Documents - Project Systems Review Plan - GSFC-STD-1001 Criteria for Flight Project Critical Milestone Reviews	
Place/Time/Purpose of Delivery: - Provide the review agenda to the Project Office fourteen (14) days prior to commencement of the review for information - Provide the review presentation materials to the Project Office seven (7) days prior to the review for information - Provide review related reference materials to the Project Office at the review for information	
Preparation Information: See the guidelines presented in the related documents.	

DID 8-2 Action Item Responses

Title: Action Item Responses	CDRL No.: 8-2
Reference: MAR Paragraph 8.1	
Use: To respond to action items resulting from the review.	
Related Documents - Project Systems Review Plan (provided by Project Office) - GSFC-STD-1001 Criteria for Flight Project Critical Milestone Reviews	
Place/Time/Purpose of Delivery: - Provide response to action items to the Project Office thirty (30) days after end of review for approval	
Preparation Information: See the guidelines presented in the related documents.	

DID 8-3 Peer Review Program

Title: Peer Review Program	CDRL No.: 8-3
Reference: MAR Paragraph 8.2	
Use: To provide the basis for conducting the developer's peer review program.	
Related Documents - GPR 8700.6 Engineering Peer Reviews	
Place/Time/Purpose of Delivery: - Provide to the Project Office sixty (60) days after contract award for review	
Preparation Information: See the guidelines presented in the related document.	

DID 9-1 System Performance Verification plan

Title: System Performance Verification Plan	CDRL No.: 9-1
Reference: MAR Paragraph 9.1	
Use: Establishes the System Performance Verification Plan.	
Related Documents: - GSFC-STD-7000 General Environmental Verification Standard (GEVS) for GSFC Flight Programs and Projects	
Place/Time/Purpose of Delivery: - Provide preliminary plan to Project Office ninety (90) days after contract award for review - Provide final plan to Project Office thirty (30) days prior to CDR for approval	
Preparation Information: The System Performance Verification Plan shall be prepared to comply with the requirements of paragraph 2.1.1.1 of GSFC-STD-7000.	

DID 9-2 Environmental Verification Plan

Title: Environmental Verification Plan	CDRL No.: 9-2
Reference: MAR Paragraph 9.2	
Use: Establishes the Environmental Verification Plan.	
Related Documents: - GSFC-STD-7000 General Environmental Verification Standard (GEVS) for GSFC Flight Programs and Projects	
Place/Time/Purpose of Delivery: - Provide preliminary plan to Project Office ninety (90) days after contract award for review - Provide final plan to Project Office thirty (30) days prior to CDR for approval	
Preparation Information: The Environmental Verification Plan shall be prepared to comply with the requirements of paragraph 2.1.1.1.1 of GSFC-STD-7000.	

DID 9-3 System Performance Verification matrix

Title: System Performance Verification Matrix	CDRL No.: 9-3
Reference: MAR Paragraph 9.3	
Use: Establishes the System Performance Verification Matrix.	
Related Documents: - GSFC-STD-7000 General Environmental Verification Standard (GEVS) for GSFC Flight Programs and Projects	
Place/Time/Purpose of Delivery: - The updated System Performance Verification Matrix shall be included in the data packages for the Integrated Independent Reviews, beginning with PDR, for review	
Preparation Information: The System Performance Verification Matrix shall be prepared and maintained per the requirements of paragraph 2.1.1.2 of GSFC-STD-7000.	

DID 9-4 environmental test matrix

Title: Environmental Test Matrix	CDRL No.: 9-4
Reference: MAR Paragraph 9.4	
Use: Establishes a matrix that summarizes the environmental tests and test status for flight hardware and other equipment.	
Related Documents: - GSFC-STD-7000 General Environmental Verification Standard (GEVS) for GSFC Flight Programs and Projects	
Place/Time/Purpose of Delivery: - The updated matrix shall be included with the review data package for milestone reviews beginning with PDR for review	
Preparation Information: Guidelines for environmental test matrices are in paragraph 2.1.1.2.1 of GSFC-STD-7000. An example of an environmental test matrix is given in Figure 2.1-1 .	

DID 9-5 verification reports

Title: Verification Reports	CDRL No.: 9-5
Reference: MAR Paragraph 9.5	
Use: Establishes the requirement to submit Verification Reports	
Related Documents: - GSFC-STD-7000 General Environmental Verification Standard (GEVS) for GSFC Flight Programs and Projects	
Place/Time/Purpose of Delivery: - Preliminary verification report shall be provided to Project Office within 72 hours of test completion for information - Final verification report shall be provided to Project Office within thirty (30) days of test completion for information	
Preparation Information: The Verification Reports shall be prepared to comply with the requirements of paragraph 2.1.1.5 of GSFC-STD-7000.	

DID 9-6 System Performance Verification report

Title: System Performance Verification Report	CDRL No.: 9-6
Reference: MAR Paragraph 9.6	
Use: Establishes a Performance Verification Report that compares hardware/software specifications with the final verified values.	
Related Documents: - GSFC-STD-7000 General Environmental Verification Standard (GEVS) for GSFC Flight Programs and Projects	
Place/Time/Purpose of Delivery: - Updated reports shall be provided with the review data package at milestone reviews, beginning with PDR, for information - The final report shall be submitted within thirty (30) days after completion of on-orbit checkout for information	
Preparation Information: The System Performance Verification Report shall be prepared and maintained per paragraph 2.1.1.6 of GSFC-STD-7000.	

DID 10-1 ESD Control Plan

Title: ESD Control Plan	CDRL No.: 10-1
Reference: MAR Paragraph 10.3	
Use: Implementation of an ESD control program at the developer's facility	
Related Documents: - ANSI/ESD S20.20 For the Development of an Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices)	
Place/Time/Purpose of Delivery: The developer shall submit an ESD Control Plan to the Project thirty (30) days prior to PDR for review	

DID 11-1: Parts Control Program

Title:	DID No.:
Parts Control Program	11-1

Reference:

MAR Paragraph 11.1

Use:

Development and implementation of an EEE parts control program that addresses the system requirements for mission lifetime and reliability.

Related Documents

- GSFC EEE-INST-002 Instructions for EEE Parts Selection, Screening, Qualification, and Derating
- S-311-M-70 Specification for Destructive Physical Analysis

Place/Time/Purpose of Delivery:

- The developer shall submit the PCP to the project office thirty (30) days after contract award for approval.

Preparation Information:

The PCP shall address the following:

- Shelf life control plan
- Parts application derating
- Supplier and manufacturer surveillance
- Qualification
- ASICs, Gate Arrays, System-on-chip, Custom ICs
- Incoming inspection and test
- Destructive Physical Analysis
- Defective parts controls program.
- Radiation hardness assurance
- Handling, preservation, and packing
- Contamination control
- Alternate quality conformance inspection and small lot sampling
- Traceability and lot control
- Failure analysis

DID 11-2: Parts Control Board

Title:	DID No.:
Parts Control Board	11-2
Reference: MAR Paragraph 11.2	
Use: Organization and operation of the Parts Control Board regarding the implementation of the Parts Control Program.	
Related Documents	
Place/Time/Purpose of Delivery: The developer shall submit the Parts Control Board operating procedures to the project office thirty (30) days after contract award for approval.	
Preparation Information: The developer shall address the following in the Parts Control Board procedures: - Organization and membership - Meeting schedule - Meeting notices - Distribution of meeting agenda, notes, and minutes - Review and approval responsibilities and processes	

DID 11-3: Parts Identification List

Title: Parts Identification List (PIL)	CDRL No.: 11-3
Reference: MAR Paragraph 11.3.1	
Use: A list of EEE parts that may be selected for use in flight hardware.	
Related Documents	
Place/Time/Purpose of Delivery: - The developer shall submit EEE parts to be added to the PIL to the Parts Control Board ten (10) business days prior to the first PCB meeting for approval by the PCB	
Preparation Information: The Parts Identification List shall contain the following information: - Flight component identity to the circuit board level - Complete part number (i.e. DSCC part number, SCD part number, with all suffixes) - Manufacturer's Generic Part number - Manufacturer (not distributor) - Part Description (please include meaningful detail) - FSC - Procurement Specification - Comments and clarifications, as appropriate - Estimated quantity required (for procurement forecasting)	

DID 11-4: Project approved Parts, List

Title: Project Approved Parts List (PAPL)	CDRL No.: 11-4
Reference: MAR Paragraph 11.3.2	
Use: A list of EEE parts that are approved by the Parts Control Board for use in flight hardware.	
Related Documents	
Place/Time/Purpose of Delivery: - The developer shall submit EEE parts to be added to the Project Approved Parts List to the Parts Control Board ten (10) business days prior to the PCB meeting at which they will be presented for approval by the PCB	
Preparation Information: The PAPL shall contain all PIL fields plus the following information: - Procurement Part Number - Flight Part Number (if different from the procurement part number) - Package Style/Designation - Single Event Latch-up (SEL) Hardness/Tolerance and Data Source - Single Event Upset (SEU) Hardness/Tolerance and Data Source - Total Ionizing Dose (TID) Hardness/Tolerance and Data Source - Displacement Damage Hardness/Tolerance and Data Source - Proton Hardness/Tolerance and Data Source - PMPCB Status - PMPCB Approval Date - PMPCB Required Testing/Evaluations	

DID 11-5: As designed Parts List

Title: As Designed Parts List (ADPL)	CDRL No.: 11-5
Reference: MAR Paragraph 11.3.3	
Use: A list of EEE parts that are designed into in flight hardware.	
Related Documents	
Place/Time/Purpose of Delivery: - The developer shall submit EEE Parts to be added to the As Designed Parts List to the Parts Control Board ten (10) business days prior to the PCB meeting at which they will be presented for approval by the PCB	
Preparation Information: The As Designed Parts List (ADPL) shall contain all PAPL fields plus the following information: - Assembly Name/Number - Next Level of Assembly - Need Quantity - Reference Designator(s) - Item number (if applicable)	

DID 11-6: As Built Parts List

Title: As Built Parts List (ABPL)	CDRL No.: 11-6
Reference: MAR Paragraph 11.3.4	
Use: A list of EEE parts that are used in the flight hardware.	
Related Documents	
Place/Time/Purpose of Delivery: - The developer shall submit EEE Parts to be added to the As Built Parts List to the Parts Control Board ten (10) business days prior to the PCB meeting at which they will be reviewed by the PCB	
Preparation Information: The As Built Parts List (ABPL): shall contain all ADPL fields plus the following minimum information: - Assembly serial number - Next Level of Assembly serial number - Lot/Date/Batch/Heat/Manufacturing Code, as applicable - Manufacturer's Cage Code (specific plant location preferred) - Distributor/supplier, if applicable - Part serial number (if applicable)	

DID 12-1 Materials and Processes Selection, Implementation, & Control Plan

Title: Materials and Processes Selection, Implementation, & Control Plan	CDRL No.: 12-1

Reference:
MAR Paragraph 12.1

Use:
Defines the implementation of NASA-STD-6016 with the prescribed changes.

Related Documents:
NASA-STD-6016 Standard Materials and Processes Requirement for Spacecraft

Place/Time/Purpose of Delivery:
- Provide to the Project Office sixty (60) days after contract award for approval.

Preparation Information:

For each paragraph in Paragraphs 4 and 5 of NASA-STD-6016 with the prescribed changes, the plan shall state the requirement from NASA-STD-6016, identify the degree of conformance under the subheading "Degree of Conformance," and identify the method of implementation under the subheading "Method of Implementation."

The plan shall address the following:
- Conformance to the requirements of NASA-STD-6016 with the prescribed changes and describe the method of implementation.
- Organizational authority and responsibility for review and approval of M&P specified prior to release of engineering documentation.
- Identification and documentation of Materials and Processes
- Procedures and data documentation for proposed test programs to support materials screening and verification testing
- Materials Usage Agreement (MUA) Procedures
- Determination of material design properties, including statistical approaches to be employed.
- Identification of process specifications used to implement requirements in NASA-STD-6016.

Robotic Missions
- In addition to the requirements of paragraph 4.2.2.11, the developer shall implement a lead-free control plan (LFCP) per GEIA-STD-0005-1 and a tin whisker control plan per Level 2C requirements of GEIA-STD-0005-2 for the use of solders or surface finishes that are less than 3% lead by weight (DID 12-2).
- In paragraph 4.1.2, the developer may use GFSC forms or the developer's equivalent forms in lieu of the MAPTIS format.

- The developer may use the GSFC outgassing database in addition to MAPTIS (URL http://outgassing.nasa.gov).
- The developer shall use AFPCMAN91-710V3 Range Safety Users Requirements Manual section 10.1 in place of paragraph 4.2.1.
- In addition to the requirements of paragraph 4.2.3.4, the developer shall qualify all lubricated mechanisms either by life testing in accordance with a life test plan or heritage with an identical mechanism used in an identical application (DID 12-3).
- In addition to the requirements of paragraph 4.2.3.6, the developer shall provide the vacuum bake out schedule for materials that fail outgassing requirements with the MUIL or MUA.
- Paragraph 4.2.3.8 does not apply.
- In paragraph 4.2.5.1, the developer shall develop and implement a Non-Destructive Evaluation only for fracture critical flight hardware.
- In paragraph 4.2.6.5, the developer shall use 541-PG-8072.1.2 GSFC Fastener Specification in place of NASA-STD-(I)-6008.

DID 12-2Life Test Plan for Lubricated Mechanisms

Title: Life Test Plan for Lubricated Mechanisms	CDRL No.: 12-2

Reference:
MAR Paragraph 12.2

Use:
Defines the life test evaluation process, acceptance criteria, and reporting for lubricated mechanisms.

Related Documents:
- NASA-STD-6016 Standard Materials and Processes Requirement for Spacecraft
- NASA-TM-86556 Lubrication Handbook for the Space Industry (Part A: Solid Lubricants, Part B: Liquid Lubricants)
- NASA/CR-2005-213424 Lubrication for Space Applications

Place/Time/Purpose of Delivery:
- Provide plan to the Project thirty (30) days prior to PDR for approval
- Provide report to the Project thirty (30) days after acceptance test completion for review

Preparation Information:
The Life Test Plan for Lubricated Mechanisms shall contain:

- Table of Contents
- Description of lubricated mechanisms, performance functions, summary of subsystem specification, and life requirements.
- Heritage of identical mechanisms and descriptions of identical applications.
- Design, drawings, and lubrication system used by the mechanism.
- Test plan, including vacuum, temperature, and vibration test environmental conditions.
- Criteria for a successful test.
- Final report.

DID 12-3Materials Usage Agreement

Title: Materials Usage Agreement (MUA)	CDRL No.: 12-3

Reference:
MAR Paragraph 12.3

Use:
Establishes the process for submitting a MUA for a material or process that does not meet the requirements of NASA-STD-6016 and does not affect reliability or safety when used per the Materials and Processes Selection, Control, and Implementation Plan.

Related Documents:
- NASA-STD-6016 Standard Materials and Processes Requirement for Spacecraft
- MSFC-STD-3029 Guidelines for the Selection of Metallic Materials for Stress Corrosion Cracking Resistance in Sodium Chloride Environments

Place/Time/Purpose of Delivery:
- Provide Category I and II MUAs to the Project thirty (30) days prior to PDR for approval
- Provide Category III MUAs to the Project thirty (30) days prior to PDR for review
- After the initial submission of MUAs, new or revised MUAs shall be provided to the Project within thirty (30) days of their identification for approval of Category I and II and Category III for review

Preparation Information:
MUAs shall be classified and submitted in a MAPTIS compatible format:
Category I MUAs - Category I MUAs are those that involve material or processes use that could affect safety or reliability but must be used for functional reasons.

Category II MUAs - Category II MUAs are those that involve material or processes use that fails a screening of Material and Processes requirements and is not considered a hazard in its use application but for which no Category III rationale code exists.

Category III MUAs - Category III MUAs are those that involve materials or processes that have not been shown to meet these requirements but have an approved rationale code listed in Appendix B of NASA-STD-6016. They are evaluated and determined to be acceptable at the configuration/part level.

The MUA package shall include the technical information required to justify the application. MUAs for stress corrosion shall include a Stress Corrosion Cracking Evaluation Form per MSFC-STD-3029 (see NASA-STD-6016) and a stress analysis.

DID 12-4Materials Identification and Usage List

Title: Materials Identification and Usage List (MIUL)	CDRL No.: 12-4

Reference:
MAR Paragraph 12.4

Use:
Establishes the Materials Identification and Usage List (MIUL).

Related Documents:
- NASA-STD-6016 Standard Materials and Processes Requirement for Spacecraft

Place/Time/Purpose of Delivery:
- Provide to the Project Office thirty (30) days prior to PDR for review
- Provide updates to the Project Office within thirty (30) days of identification for review

Preparation Information:
The MIUL shall be delivered in a MAPTIS compatible form and shall identify the following information as applicable to the material or process:

- Detail drawing and dash number
- Next assembly and dash number
- Change letter designation
- Drawing source (contractor or vendor)
- Material form
- Material manufacturer and manufacturer's designation
- Material specification
- Process specification
- Environment
- Weight
- Material code
- Standard/commercial part number
- Contractor
- System and subsystem
- Maximum and minimum temperature
- Fluid type
- Surface Area
- Associate contractor number
- Project
- Document title
- Criticality
- Line number
- Overall evaluation
- Overall Configuration test
- Maximum and minimum pressures
- Test MUA Document
- Cure codes

DID 12-5Nondestructive evaluation plan

Title: Nondestructive Evaluation Plan	CDRL No.: 12-5
Reference: MAR Paragraph 12.5	
Use: Establishes the Non-Destructive Evaluation (NDE) plan for the procedures and specifications employed in the inspection of materials.	
Related Documents: - NASA-STD-6016 Standard Materials and Processes Requirement for Spacecraft - MIL-HDBK-6870, Inspection Program Requirements, Nondestructive for Aircraft and Missile Materials and Parts - MSFC-STD-1249, Standard NDE Guidelines and Requirements for Fracture Control Programs -	
Place/Time/Purpose of Delivery: - Provide to the Project thirty (30) days prior to PDR for review - Provide to the Project thirty (30) days prior to CDR for approval - Provide updates to the Project thirty (30) days after identification for approval	
Preparation Information: The NDE Plan shall describe the process for establishment, implementation, execution and control of NDE. The plan shall meet the intent of MIL-HDBK-6870, Inspection Program Requirements, Nondestructive for Aircraft and Missile Materials and Parts and MSFC-STD-1249, Standard NDE Guidelines and Requirements for Fracture Control Programs, as specified by NASA-STD-6016. The plan shall define NDT planning and requirements to include the following: - Hardware Design - Manufacturing Planning - Personnel Training - NDE Reliability Requirements for Fracture Critical Parts - NDE Reporting	

DID 12-6Printed Wiring Boards Test Coupons

Title: Printed Wiring Board (PWB) Test Coupons	CDRL No.: 12-6
Reference: MAR Paragraph 12.6	
Use: PWB test coupons are evaluated to validate that PWBs are suitable for use in space flight and mission critical ground applications.	
Related Documents: - IPC-6011 Generic Performance Specifications for Printed Boards (Class 3 Requirements) - IPC-6012B Qualification and Performance Specification for Rigid Printed Boards (Class 3/A Requirements /Performance Specification Sheet for Space and Military Avionics) - IPC-6013 Qualification and Performance Specification for Flexible Printed Boards (Class 3) - IPC-6018 Microwave End Product Board Inspection and Test - IPC A-600 Guidelines for Acceptability of Printed Boards (Class 3 Requirements)	
Place/Time/Purpose of Delivery: - The developer shall deliver test coupons and supporting manufacturing information traceable to the flight boards to GSFC or a GSFC-approved laboratory as soon as practicable for analysis of the printed wiring boards for approval - In the case that a GSFC-approved laboratory is used, the developer shall deliver the laboratory results to GSFC with the end item data package	
Preparation Information: Notify GSFC regarding shipment of PWB test coupons.	

DID 13-1 Contamination Control Plan and Data

Title: Contamination Control Plan and Data	CDRL No.: 13-1

Reference:
MAR Paragraph 13.1

Use:
To establish contamination allowances, methods for controlling contamination, and record test results

Related Documents:
- GSFC-STD-7000 General Environmental Verification Standard (GEVS)
- GSFC-STD-1000 Rules for the Design, Development, Verification, and Operation of Flight Systems
- ASTM E595 Standard Test Methods for Total Mass Loss and Collected Volatile Condensable Materials from Outgassing in a Vacuum Environment
- Outgassing Data for Selecting Spacecraft Materials (URL: http://outgassing.nasa.gov/)

Place/Time/Purpose of Delivery:
- Provide to the Project Office thirty(30) days before PDR for GSFC review
- Provide to the Project Office thirty (30) days before the CDR for approval
- Final thermal vacuum bakeout results provided to the Project Office within thirty (30) of completion for review
- Provide contamination certificate of compliance with End Item Acceptance Data Package (DID 16-1)

Preparation Information:
The developer shall provide: material properties data; design features; test data; system tolerance of degraded performance; methods to prevent degradation. The items below shall be addressed in the plan:
- Beginning of life and end of life contamination requirements for contamination sensitive surfaces or subsystems
- Methods and procedures used to measure and maintain the levels of cleanliness required during each of the various phases of the item's lifetime (e.g., protective covers, environmental constraints, purges, cleaning/monitoring procedures)
- Materials
  - Outgassing as a function of temperature and time.
  - Nature of outgassing chemistry.
  - Areas, weight, location, view factors of critical surfaces.
- Venting: size, location and relation to external surfaces.
- Thermal vacuum test contamination monitoring plan, to include vacuum test data, QCM location and temperature, pressure data, system temperature profile, and shroud temperature.
- On-orbit spacecraft and instrument performance as affected by contamination deposits.
  - Contamination effect monitor
  - Methods to prevent and recover from contamination in orbit
  - Evaluation of on-orbit degradation
  - Photopolymerization of outgassing products on critical surfaces

    - Space debris risks and protection
    - Atomic oxygen erosion and re-deposition
- Analysis of contamination impact on the satellite on orbit performance
- In orbit contamination impact from other sources such as STS, space station, and adjacent instruments
- Ground/Test support equipment controls to prevent contamination of flight item(s)
- Facility controls and processes to maintain hardware integrity (protection and avoidance)
- Training
- Data package on test results for materials and as-built product

DID 15-1 GIDEP ALERT / NASA ADVISORY DISPOSITIONs

Title: GIDEP Alert / NASA Advisory Dispositions	CDRL No.: 15-1

Reference:
MAR Paragraph 15.4

Use:
Document the developer's disposition of GIDEP ALERTs; GIDEP SAFE-ALERTs; GIDEP Problem Advisories; GIDEP Agency Action Notices; NASA Advisories and component issues, hereinafter referred to collectively as "Alerts" with respect to parts and materials used in NASA product

Related Documents:
- GIDEP Operations Manual (SO300- BT-PRO-010)
- GIDEP Requirements Guide (S0300-BU-GYD-010)

Place/Time/Purpose of Delivery:
- Provide disposition of existing Alerts to the Project Office within 30 days of identification of potential use or use of an EEE part or material for review
- Provide disposition of subsequent Alerts to the Project Office regarding EEE parts or materials already approved for use within 30 days for review

Preparation Information:
The developer shall submit:
- A list in accordance with the requirements of the appropriate DID of Paragraph 11 and Paragraph 12 with a notation for each line item as to whether there are applicable Alerts.
- The lists submitted per Paragraph 11 and Paragraph 13 shall be updated with Alert information as parts and materials are added.
- GSFC Form 4-37, "Problem Impact Statement Parts, Materials and Safety" or equivalent developer form, for Alerts provided by the GSFC Project Office.

DID 15-2 significant parts, materials, and safety problems

Title: Significant parts, materials, and safety problems	CDRL No.: 15-2
Reference: MAR Paragraph 15.4	
Use: Document the developer's identification of significant parts, material, and safety problems and the developer's actions as required by the GIDEP manual regarding the decision to prepare an Alert, including the type of Alert that is applicable.	
Related Documents: - GIDEP Operations Manual (SO300- BT-PRO-010) - GIDEP Requirements Guide (S0300-BU-GYD-010)	
Place/Time/Purpose of Delivery: - Deliver to the Project Office within thirty (30) days of identification for review	
Preparation Information: The developer shall submit relevant information (e.g., failure analyses, test reports, root cause and corrective action evaluations).	

DID 16-1 End Item Acceptance Data Package

Title: End Item Acceptance Data Package	CDRL No.: 16-1

Reference:
MAR Paragraph 16.1

Use:
The End Item Acceptance Data Package documents the design, fabrication, assembly, test, and integration of the hardware and software being delivered and is included with the end item delivery.

Related Documents:

Place/Time/Purpose of Delivery:
Provide the End Item Acceptance Data Package to the Project thirty (30) days prior to end item delivery for approval.

Preparation Information:
The developer prepares the End Item Acceptance Data Package as part of design development and implementation such that it is completed prior to delivery. The following items shall be included:

- The deliverable item name, serial number, part number, and classification status (e.g., flight, non-flight, ground support, etc.).
- Appropriate approval signatures (e.g., developers quality representative, product design lead, government Representative, etc.)
- List of shortages or open items at the time of acceptance with supporting rationale.
- As-built serialization
- As-built configuration
- In-process Work Orders (available for review at developers--not a deliverable)
- Final assembly and test Work Order
- Nonconformance reports
- Acceptance testing procedures and report(s), including environmental testing
- Trend data
- Anomaly/problem failure reports with root cause and corrective action dispositions
- As-built EEE parts list
- As-built materials list
- Chronological history, including:
    - Total operating hours and failure-free hours of operation
    - Total number of mechanical cycles and remaining cycle life
- Limited life items, including data regarding the life used and remaining
- As-built final assembly drawings
- PWB coupon results
- Photographic documentation of hardware (pre and post-conformal coating for printed wiring assemblies, box or unit, subsystem, system, harness, structure, etc.)
- Waivers
- Certificate of Compliance which were signed by management